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Original Article

A multicentered study on management of hypertension and use of antihypertensives for patients undergoing hemodialysis

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ABSTRACT

Background: There is a strong relationship between Hypertension (HTN) and chronic kidney disease (CKD). The study aims in assessing the use of antihypertensive in CKD patients. **Objective:** to observe and analyze the use of antihypertensive for patients undergoing dialysis and to find the prevalence of hypertension in CKD patients along with intradialytic complications. **Methodology:** A prospective observational study was conducted in the department of nephrology in BGS Gleneagles Hospital and Excel Care Hospital, Bengaluru for a period of 6 months. **Results:** A total of 123 patients consisting of 85 male (69.10%) and 38 female (30.89%) were enrolled. The most commonly prescribed drugs are Calcium Channel Blockers (CCB) 82(74.54%) and Beta blockers 59(53.63%) and followed by other antihypertensives. The prevalence of HTN in CKD was found to be 95.93%. Fluid overload status 16(13%), hypotension 5(4.06%), hypertension 04(3.25%), breathlessness 3(2.43%), pain at fistula site 02(1.62%), hypoglycemia 02(1.62%), abdominal pain 02(1.62%), weakness, itching and cramps 3(2.43%), and chills, fever and body pains 02(1.62%) were the intradialytic complications observed. **Conclusion:** From the present study it can be concluded that CCBs are the most commonly prescribed class of antihypertensive. The prevalence of hypertension in CKD seems to follow an increasing trend with increasing age. Special consideration is required for the diagnosis and management of intradialytic complications because such complications could be managed successfully without the need for termination of the dialysis procedure.

Keywords: Hypertension, CKD, Intradialytic complication, Antihypertensive medications.

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INTRODUCTION

Hypertension (HTN) is defined by persistent elevation of arterial blood pressure (BP). The Seventh Report of the Joint National Committee(JNC 7) on the Detection, Evaluation, and treatment of High Blood Pressure (JNC 7) classifies adult BP. Patients with diastolic blood pressure (DBP) values <90 mm Hg and systolic blood pressure (SBP) values ≥140 mm Hg have isolated systolic hypertension. A hypertensive crisis (BP >180/120 mm Hg) may be categorized as either a hypertensive emergency or a hypertensive urgency.[1] HTN is the most common modifiable risk factor for cardiovascular diseases (CVD), stroke and renal failure.[2] It is estimated 55,000 deaths were directly attributable to HTN and it was also considered as an underlying cause in other 3,00,000 deaths (Rosamond et al., 2008). The report of World Health Organization states that high BP is the primary or may be secondary cause in some cases for 50% of renal failure and CVD and subsequent deaths worldwide.[3]

HTN is a common morbidity in 75% of adults with CVD like myocardial infarction, angina pectoris, coronary heart disease, stenosis, arrhythmias etc. It is the second driving reason for Chronic Kidney Disease (CKD). Regardless of the accessibility of a wide scope of antihypertensive medications, hypertension and its complications are still an important cause of adult morbidity and mortality.[4]

BP lowering agents significantly reduces the risk of CVD and death-a reduction of 10 mm Hg systolic BP reduced the risk of CVD by 20%, coronary heart disease by 17%, Stroke by 27%, heart failure by 28% and all other mortalities by 13%. Treatment rates of HTN increased from 65% to 75% and adequate BP control from 40%to 52%.[5]

The primary goal of antihypertensive therapy is to prevent morbidity and mortality in hypertensive patients. Two or three antihypertensive medications have to be prescribed for adequate control BP. Inappropriate prescribing has become a problem in the health care system. The increase in prevalence of HTN and cost of medications influence physicians prescribing patterns and compliance of the patients. Appropriate prescribing of medicines is important for the better outcome of the patients and reduce complications such as CVD, Renal failure.[6]

Chronic kidney disease (CKD) is decline kidney function which is age related advanced in HTN, diabetes, obesity and primary renal disorders. Decline in renal function leads to cognitive dysfunction, poor quality of life and prolonged hospitalization. CKD can be measured by Glomerular Filtration Rate (GFR), Albumin Creatinine Ratio.[7] CKD is classified into 5 stages based on kidney function according to Kidney Disease Outcomes Quality Initiative (KDOQI) CKD classification.

Table 1: KDOQI CKD CLASSIFICATION[8]

STAGE	DESCRIPTION	GFR (ml/min/1.73m^2)
1	Kidney damage with normal or ↑ GFR	≥90
2	Kidney damage with mild ↓ GFR	60-89
3	Moderate ↓ GFR	30-59
4	Severe ↓ GFR	15-29
5	Kidney failure	< 15(or dialysis)

The prevalence of CKD has increased in the period of 1999 to 2007 in developed and also developing countries. The prevalence of 10-13% was seen in the populations of India, China, Japan, Taiwan, Canada and USA.[9]

CKD has a high global prevalence with a consistent estimated global CKD prevalence of between 11 to 13% with the majority stage 3.CKD is an independable risk factor for Cardiovascular diseases.[7]

Patients with hypertension undergoing dialysis: Patients with End-Stage Renal Disease (ESRD) require health care resources like dialysis and have higher rates of morbidity and mortality. Age, gender, race, nonrenal comorbidity, malnutrition, and dose of dialysis are strong predictors of death among dialysis patients.[10]

The BP goal for ESRD patients undergoing dialysis is not well defined by National Kidney Foundation KDQOI guidelines but < 140/90 and 130/80 mmHg for pre dialysis and post dialysis respectively were suggested and other studies suggested a mean arterial pressure of <99 mmHg. Systolic HTN is seen more in dialysis patients than diastolic HTN. Hence systolic BP is positively associated with stroke and Coronary Heart Disease (CHD) so thus the control of systolic BP can prevent stroke and CHD in hypertensive and non hypertensive patients.[17]Patients with CKD have more chances to die, largely from CVD .The patients with ESRD have eight times higher rate of mortality compared to general population, with CKD and CVD 50% mortality was accounted.. In this particular population maintaining the target BP goal is a challenge. So, the administration of two anti hypertensives is necessary from the initial stage,

especially if the systolic blood pressure (SBP) is ≥150 mmHg. In such cases an anti-renin–angiotensin–aldosterone system (RAAS) drug and either a Diuretic or Calcium Channel Blocker (CCB) are preferred.[11]
There is a trend to start dialysis earlier in patients with chronic renal failure. The current Dialysis Outcomes Quality Initiative (DOQI) guidelines suggest that dialysis should be started when renal function expressed as weekly Kt/V drops below 2.0 (8).

The CANUSA (Canada-USA study on dialysis) study also showed significantly poorer survival for patients with early initiation of dialysis. And also found that these patients had significantly more comorbidities.[12]

Due to the advancements in technology and reliability of dialysis machine, HD can be done at home or outpatient department. However, complication does occur during dialysis due to technical problem combined with comorbid conditions of the patient. The common complications include hypotension and arrythmias which are resolved by fluid balance. There is a probability of severe cardiopulmonary collapse which is rare during dialysis. Other complications include anaphylactoid reactions include pruritis, chest tightness, angioedema, pulmonary emboli; cerebral complications include cerebral disequilibrium syndrome, intracranial haemorrhage; problem`s with anticoagulants include gastrointestinal bleeding, sub capsular hepatic hematoma, retroperitoneal haemorrhage.[13]

In CKD patients, dialysis is the best method to remove accumulated toxins from the body and improve the quality of life. But this process, by itself, may complicate the condition due to its side effects. Individuals suffering from CKD, who are on dialysis, could be at increased cardiovascular and metabolic risk . There is an urgent need to educate CKD, patients about facts related to the disease, medications, dietary habits, and the various measures required to manage the condition and lead a productive life.[14] Therefore the control and monitoring of HTN in these patients is vital. Though there are certain guidelines (KDOQI) regarding the combination of drugs for different target ranges, but the few other studies stated that HTN is not being controlled and there are huge fluctuations. This requires the pharmacist to intervene and develop strategies, monitor lab tests, follow up, adapt drug dosage, prescription audit aimed towards better patient care and improving quality of life of the patients. Hence, this study mainly aims in focusing on the management of HTN and use of antihypertensives in patients undergoing dialysis.

METHODOLOGY

Study site: BGS Gleneagles Hospital and Excel Care Hospital, Bangalore.

Study period: The study will be carried out for a period of six months.

Study Design: A prospective observational study.

Study Criteria:
Inclusion Criteria:
1) Patients of age >18yrs
2) Patients undergoing maintenance haemodialysis.
Exclusion Criteria:
1) Clinical trial patients.
2) Patients with Acute Renal Failure.
3) Patients with other kidney diseases who are not on dialysis, tumours (cancer) and trauma (accident)

Source of data: The data necessary for the study was collected from patient case file in dialysis unit.

Ethical Approval: The study was approved by Institutional Ethical Committee of BGS Gleneagles Hospital, Bengaluru and Excel Care Hospital, Bengaluru.

Study Procedure: It was a prospective observational study carried out for a period of 6 months for dialysis patients. All the cases were reviewed and those who met the study criteria were followed and drug therapy details were recorded in the suitable data collection form as per the need of the study.

Statistics: Descriptive statistics.

RESULTS

Table 2: Number of antihypertensive per prescription

No. of antihypertensives per prescription	Number of subjects	Percentage
Monotherapy	20	16.26%
Dualtherapy	46	37.39%
Triple therapy	23	18.69%
>3	13	10.56%
Not prescribed with antihypertensives	21	17.07%

Figure 1: Number of antihypertensive per prescription

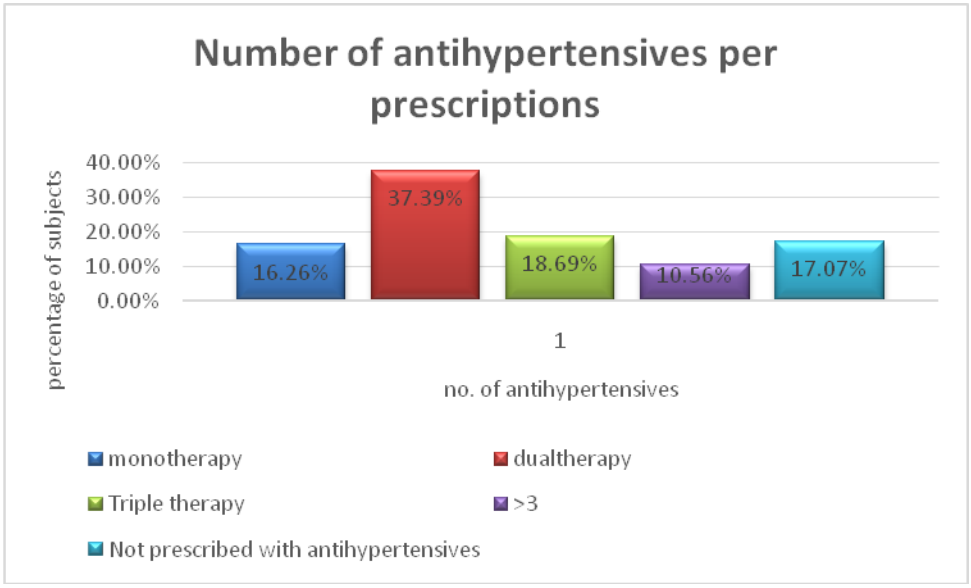
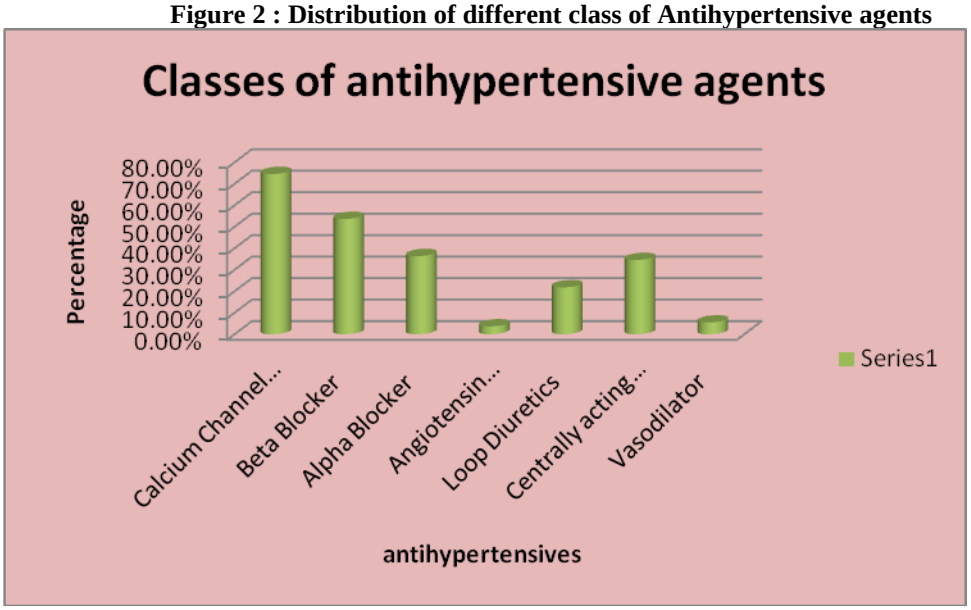


Table 2 and figure 1 implies that, 37% of patients were on two antihypertensive agent and 17% of them were on no antihypertensives.

Table 3: Distribution of different class of Antihypertensive agents among 118 subjects with HTN (n=118)

Class of antihypertensives prescribed	No. of subjects receiving	Percentage
Calcium Channel Blockers	82	74.54%
Beta Blocker	59	53.63%
Alpha Blocker	40	36.36%
Angiotensin Receptor Blockers	04	3.63%
Loop Diuretics	24	21.81%
Centrally acting alpha agonist	38	34.54%
Vasodilator	06	5.45%

Figure 2 : Distribution of different class of Antihypertensive agents



According to table 3 and figure 2, Most of the patients are receiving Calcium channel blockers(74.54%), beta blockers(53.63%), alpha blockers(36.36%) and centrally acting alpha agonists(34.54%).

Table 4: Percentage distribution of Intradialytic complications

Intradialytic complications	No. of subjects (N=123)	Percentage
Fluid overload status	16	13.00%
Hypotension	05	4.06%
Hypertension	04	3.25%
Breathlessness	03	2.43%
Pain at fistula site	02	1.62%
Hypoglycemia	02	1.62%
Abdominal pain	02	1.62%
Weakness, Itching and cramps	03	2.43%
Chills, fever and body pains	02	1.62%
No. of patients with no complications during dialysis	80	65.04%

Figure 3: Percentage distribution of Intradialytic complications

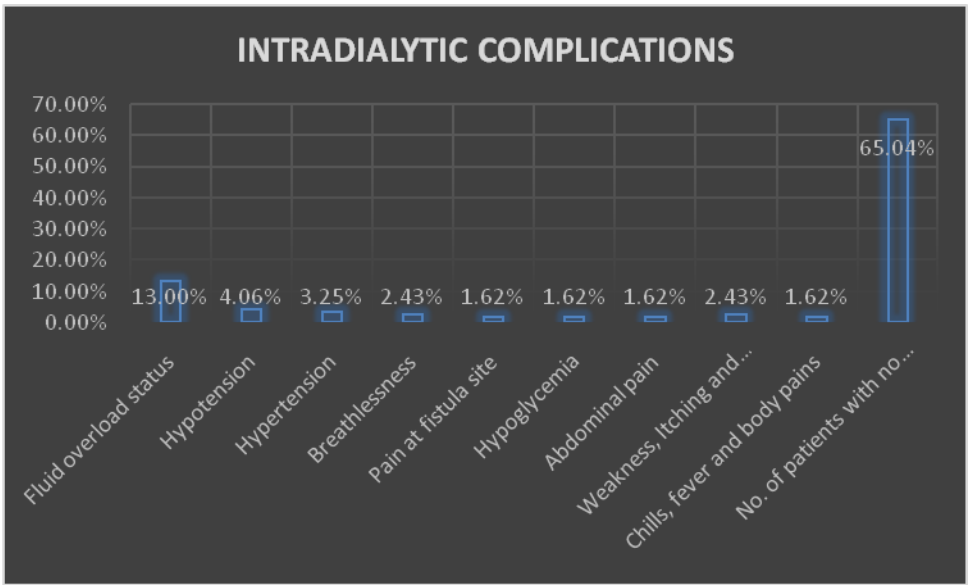


Table 4 and figure 3 implicated that, fluid overload status was found in 16(37.20%) and chills, fever and body pains was found in 2(4.65%) subjects.

DISCUSSION

Table 2 & Figure 1 shows the distribution pattern of No. of antihypertensive agents taken among 123 subjects and it was found that majority 46(37.39%) of patients were on dual therapy, 23 (18.69%) were on triple therapy, 20(16.26%) were on monotherapy, 21(17.07%) among them are not on antihypertensives, indicating that fluid retention in CKD influences the control and require multiple agents to treat and promote control.

Our results were similar to the study conducted Rohini Guptha et.al on Study of Prescribing Pattern of Drugs used in treatment of HTN in a teritiary

Care Hospital revealed that majority of the patients were on dual therapy.

From table 3 and figure 2, classes of antihypertensives prescribed were Calcium Channel Blockers 82(74.54%) followed by Beta blockers 59(53.63%), alpha blockers 40(36.36%), Centrally Acting Alpha Agonist 38(34.54%), Loop Diuretics 24(21.81%), Vasodilator 06(5.45%), Angiotensin Receptor Blocker 04(3.63%) indicating that CCBs were commonly prescribed in majority of the patients.

These results supported by the work of Rohini Guptha et.al on Study of Prescribing Pattern of Drugs used in treatment of HTN in a teritiary Care Hospital revealed that Calcium Channel Blockers were prescribed to a larger extent compared to other antihypertensives.

From table 4 and figure 3, fluid overload status was observed in 16(13%) followed by hypotension 5(4.06%), hypertension 04(3.25%), breathlessness 3(2.43%), pain at fistula site 02(1.62%), hypoglycaemia 02(1.62%), abdominal pain 02(1.62%), weakness, itching and cramsps 3(2.43%), and chills, fever and bodypains 02(1.62%).Our resuts were similar to the previous literatures.

CONCLUSION

Appropriate treatment is associated with the better survival and shortened duration of hospital stay in medical patients with CKD. In this study prescriptions were collected from inpatients. It can be concluded from our study that HTN is more common in males than in female and its prevalence seems to follow an increasing trend with increasing age. Apart from HTN, DM is most commonly observed comorbidity in CKD patients. Calcium Channel Blockers are the highest among the prescribed drugs. The number of prescribed medications increases as the GFR declines in advanced CKD patients. The practice of polypharmacy and prevalence of potential drug-drug interactions are high among the study subjects. Most of these interactions have moderate severity and intradialytic complications were observed. There is a need for special attention for the diagnosis and management of intradialytic complications of HD because such complications could be managed successfully without the need for termination of the dialysis procedure. Hyperkalaemia is more predominantly observed electrolyte imbalance. Physicians and clinical pharmacists should update their knowledge regarding current advances in treatment of ESRD patients in order to detect and avoid harmful effects and to provide effective therapy.

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